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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,661	03/22/2005	Eiji Oyaizu	017447-0188	7024

22428 7590 12/22/2006
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EXAMINER	
ROSENBERGER, FREDERICK F	
ART UNIT	PAPER NUMBER
2884	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/22/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/528,661	OYAIZU ET AL.	
	Examiner	Art Unit	
	Frederick F. Rosenberger	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/22/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d) from the International Bureau for PCT/JP03/12245, which papers have been placed of record in the file. The International Search Report, dated 20 January 2004, for said application has also been considered.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

3. Claims 1, 7, 13, and 16 are objected to because of the following informalities:

In claim 1, lines 5-6 and claim 7, lines 5-6, the phrase beginning with "emits light by..." is confusing and unclear. The phrase may be better as "which emits light in response to rays of radiation transmitted through a specimen".

In claim 13, lines 5-6 and claim 16, lines 5-6, the phrase beginning with "provided corresponding to..." is confusing and unclear. The phrase may be better as "corresponding to the charge storage capacitor, wherein the switching element reads out the electric charges."

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahara et al. (US Patent # 6,392,248).

With regards to claims 1-4, Takahara et al. disclose a phosphor sheet for a radiation detector comprising:

A support **6** (Figure 3) having a sheet shape;

A phosphor layer **7** (Figure 3) provided on the support **6**, wherein the phosphor layer emits light in response to incident X-rays (column 7, lines 37-43) and wherein the phosphor layer contains a europium activated gadolinium oxysulfide phosphor with the europium within the cited concentration range (column 17, lines 48-49) and the phosphor satisfying the cited formula (i.e. R=Gd and a=0.3).

The recitation in the preamble of claim 1 of the sheet provided to be attached to a photoelectric conversion film amounts to a recitation of intended use that does not materially affect the claimed structure of the phosphor sheet. As such, the sheet

disclosed by Takahara et al. would be capable of being attached to photoelectric conversion film and thus would meet the limitations of the claim.

With regards to claim 5, Takahara et al. further disclose the coated phosphor powder with average particle sizes of 2.0μm (column 17, lines 48-49).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 6-8, 10, 15-17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al., as applied to claim 1 above, and further in view of

Sato et al. (US Patent # 6,429,430), Tran et al. (US Patent # 5,545,899), and Okumura et al. (US Patent # 6,384,417).

With regards to claims 6-8, Takahara et al. disclose a phosphor sheet meeting the limitations of claim 1, as discussed above. However, Takahara et al. do not specifically disclose that the phosphor layer has a surface that is layered on the photoelectric conversion film. Instead, Takahara et al. provide the phosphor layer on a support with no mention of layering with a photoelectric conversion film.

Tran et al. teach a conventional X-ray detector employing a scintillating phosphor **16** (Figure 1), wherein the phosphor layer (gadolinium oxysulfide doped with europium) is layered on an array of photoelectric conversion modules **12**. Tran et al. teach that the phosphor is typically formed on the photoelectric device, thus obviating the need for the separate support disclosed by Takahara et al. However, Sato et al. teach that fabricating the phosphor on a separate support and then combining the phosphor with the photoelectric conversions device is advantageous (column 1, lines 46-52). As would be apparent to one of ordinary skill in the art, such a configuration allows for remote processing of each device without concern of fabrication compatibility issues.

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to provide the phosphor on a support and layer the phosphor sheet on a photoelectric conversion device, so as to enable the device to be used as conventional X-ray detector while allowing remote processing of the different components, as taught by Tran et al. and Sato et al.

Further, Takahara et al. are also silent with regards to the surface of the phosphor layer having a surface roughness of less than 0.3μm in average roughness.

Okumura et al. disclose the use of a europium-activated gadolinium oxysulfide phosphor in an X-ray detector, wherein the phosphor is coupled to a photodiode detector array (column 4, lines 20-25). Okumura et al. teach that in such a scenario it is beneficial to provide a surface roughness for the phosphor between 0.01μm and 0.8μm, so as to improve the matching characteristics of the phosphor with a photodiode, thereby improving the output characteristics of the phosphor (column 3, lines 32-38). Okumura et al. further disclose an example of surface roughness less than 0.3μm (column 8, lines 30-36).

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to provide a surface roughness less than 0.3μm so as to improve the matching characteristics of the phosphor and photodiode thereby improving light output of the phosphor, as taught by Okumura et al.

With regards to claim 10, Takahara et al. further disclose the coated phosphor powder with average particle sizes of 2.0μm (column 17, lines 48-49).

With regards to claim 15, the combination of Takahara et al., Tran et al., Sato et al., and Okumura et al., as applied to claim 7 above discloses all the limitations of the phosphor sheet, as discussed above. Further, the combination suggests that the phosphor sheet may be used in a layered arrangement with a photoelectric conversion film, in the form of a photodiode layer **52**, for X-ray detection. In addition, Tran et al. teach the use of a TFT readout system, which is conventional in the art (for example,

see US Patent # 6,791,091), for reading out the electric charges generated by the photodiodes in order to form an image signal (column 5, lines 23-31; column 6, lines 47-53). Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to employ a charge information reading section since such systems are conventionally known for reading out image information from a detector array.

With regards to claim 16, Tran et al. further disclose that the TFT readout matrix comprises a charge storage capacitor **54** for storing the charge from the photodiode **52** and TFT switching elements **40**, **48**, **50** corresponding to each pixel for reading out the electric charges (column 5, lines 23-28).

With regards to claim 17, Tran et al. suggests that conventional X-ray detectors involve an array of pixel elements (column 1, lines 47-49).

With regards to claim 19, Takahara et al. suggests the use of the phosphor in a film based radiographic examination (Figure 2) while Tran et al. and Sato et al. suggest coupling the phosphor with a photoelectric conversion device, as addressed with respect to claim 15 above.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al., Sato et al., Tran et al., and Okumura et al., as applied to claim 7 above, and further in view of Ohara et al. (US Patent # 6,394,650)

The combination of Takahara et al., Sato et al., Tran et al., and Okumura et al. disclose all the limitations of parent claim 7, as discussed above. However, the

combination is silent with regards to the range for the filling factor for the phosphor powder in the layer.

Ohara et al. discloses a gadolinium oxysulfide phosphor (column 9, line 27) for use in an X-ray imaging system, wherein the filling factor of the phosphor layer is greater than 60% for a particle size of 2μm to 7μm (column 6, lines 50-67). Ohara et al. further note that a reduced filling factor increases light scattering, resulting in reduced sharpness (column 19, lines 15-22).

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to use a filling factor greater than 60% so as to decrease light scattering and improve image sharpness, as taught by Ohara et al. It would have been further obvious to choose a filling factor less than 80%, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

10. Claims 11-14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahara et al., as applied to claim 1 above, and further in view of Sato et al. (US Patent # 6,429,430) and Tran et al. (US Patent # 5,545,899).

With regards to claim 11, the combination of Takahara et al., Tran et al., and Sato et al., as applied to claim 1 above discloses all the limitations of the phosphor sheet, as discussed above. Further, the combination suggests that the phosphor sheet may be used in a layered arrangement with a photoelectric conversion film, in the form

of a photodiode layer **52**, for X-ray detection. In addition, Tran et al. teach the use of a TFT readout system, which is conventional in the art (for example, see US Patent # 6,791,091), for reading out the electric charges generated by the photodiodes in order to form an image signal (column 5, lines 23-31; column 6, lines 47-53). Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to employ a charge information reading section since such systems are conventionally known for reading out image information from a detector array.

With regards to claim 12, it would have been obvious for one having ordinary skill in the art at the time the invention was made to use amorphous silicon or single crystal silicon for the photoelectric conversion film, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With regards to claim 13, Tran et al. further disclose that the TFT readout matrix comprises a charge storage capacitor **54** for storing the charge from the photodiode **52** and TFT switching elements **40**, **48**, **50** corresponding to each pixel for reading out the electric charges (column 5, lines 23-28).

With regards to claim 14, Tran et al. suggests that conventional X-ray detectors involve an array of pixel elements (column 1, lines 47-49).

With regards to claim 18, Takahara et al. suggests the use of the phosphor in a film based radiographic examination (Figure 2) while Tran et al. and Sato et al. suggest coupling the phosphor with a photoelectric conversion device, as addressed with respect to claim 11 above.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 1-4, 11-14, and 18 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 2, 6, and 7 of copending Application No. 10/547314 in view of Sato et al. (US Patent # 6,429,430) and Tran et al. (US Patent # 5,545,899).

Claim 2, of the copending application teaches the use of lutetium oxysulfide phosphor activated with Eu within the range claimed by the present application in claims 1-4. However, claim 2 does not discuss the formation of the scintillator on a support, per the limitations of claim 1.

Tran et al. teach a conventional X-ray detector employing a scintillating phosphor **16** (Figure 1), wherein the phosphor layer (gadolinium oxysulfide doped with europium) is layered on an array of photoelectric conversion modules **12**. Tran et al. teach that the phosphor is typically formed on the photoelectric device. However, Sato et al. teach that fabricating the phosphor on a separate support and then combining the phosphor with the photoelectric conversions device is advantageous (column 1, lines 46-52). As would be apparent to one of ordinary skill in the art, such a configuration allows for remote processing of each device without concern of fabrication compatibility issues.

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to provide the phosphor on a support and layer the phosphor sheet on a photoelectric conversion device, so as to enable the device to be used as conventional X-ray detector while allowing remote processing of the different components, as taught by Tran et al. and Sato et al.

Claim 6 of the copending application is further silent with regards to the charge information reading section recited in claim 11 of the present application. However, such charge information reading sections are well known in the art. Tran et al. teach the use of a TFT readout system, which is conventional in the art (for example, see US Patent # 6,791,091), for reading out the electric charges generated by the photodiodes in order to form an image signal (column 5, lines 23-31; column 6, lines 47-53). Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to employ a charge information reading section since such systems are conventionally known for reading out image information from a detector array.

Claim 7 of the copending application, when combined with the teachings of Sato et al. and Tran et al., teaches the same radiographic apparatus as currently claimed in claim 18 of the present application.

This is a provisional obviousness-type double patenting rejection.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Matsuda et al. (US Patent # 5,640,016) teach an X-ray diagnostic system (Figure 2) employing a rare-earth oxysulfide scintillator as the detector (Figure 1).

Maezawa et al. (US Patent # 6,483,122) teach a filling factor for a stimulable phosphor between 60 and 85%.

Rodricks et al. (US Patent # 6,791,091) teach that it is well known to use TFT-based digital imaging in X-ray systems employing a scintillator.

Fukuta et al. (US Patent Application Publication # 2006/0145085) is the publication for application # 10/547314.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday - Friday with flexible hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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